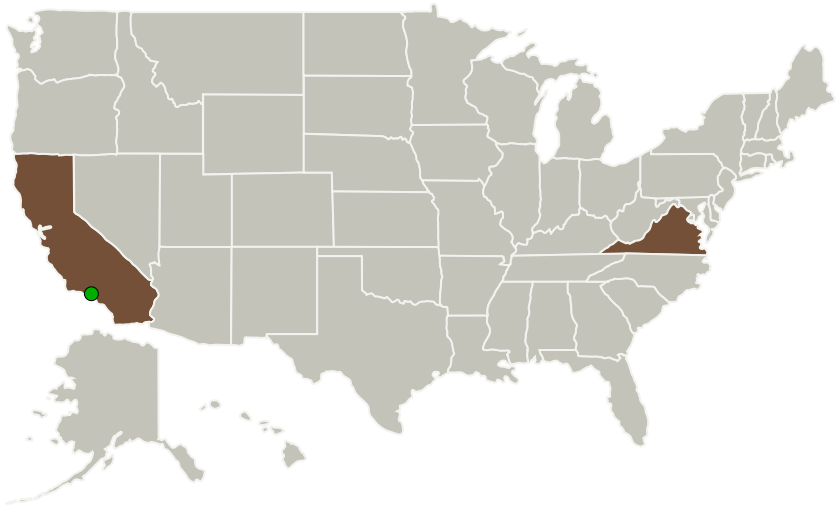
Downlink Fiber Laser Transmitter for Deep Space Communication, Phase I

Completed Technology Project (2012 - 2012)

Project Introduction

NASA's Space Communications and Navigation (SCaN) roadmap, calls for an integrated network approach to communication and navigation needs for robotic and human space exploration missions, from near-Earth to planetary missions. Anytime, anywhere connectivity for Earth, Moon and Mars is a stated goal, with high-bandwidth optical relay crosslinks for Earth, Moon, Mars and planets. Laser based optical communication links for space provides more than an order of magnitude higher data rates than corresponding RF links.. In addition, this is achieved with much smaller size, weight & power (SWaP) burden to spacecraft payloads, making spacecraft resources available to enhance or extend science missions, and the overall mission productivity. Tremendous progress made in 1.5um & 1-um fiber-optic fiber laser/amplifier technologies, their power scaling, and availability of reliable high-power components, makes such transmitters feasible for space mission application. In this SBIR proposal, we propose to develop 1.5mm fiber-amplifier based laser transmitters, with Pavg>4W, and compatible with a variety of M-ary PPM formats, that have a clear path to a space-qualification roadmap. In addition, power-scaling to 10W, athermal operation over a wide temperature range (with passive conductive cooling only), and improved power efficiency, are simultaneously addressed. Limited scope qualification tests relevant for space environment will also be conducted. These activities leverage prior and ongoing related activities at Fibertek, on high-performance, high-reliability fiber laser transmitters.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Fibertek, Inc.	Lead Organization	Industry	Herndon, Virginia
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

February 2012: Project Start

August 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140263)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Fibertek, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

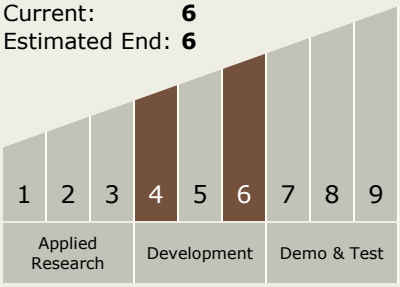
Carlos Torrez

Principal Investigator:

Doruk Engin

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.3 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System